Gems & Jewellery

April 2014 / Volume 23 / No. 3

The busy laser

Composite opal

East African yellow sapphires

Gem-A
THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

Gem-A
THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

Get closer to the source and venture to Idar-Oberstein

21 June – 28 June 2014

Visits include **Edelsteinminen Steinkaulenberg**, **Kupferbergwerk in Fischbach**, **DGemG**, **Schneider gem tools**, **Deutsches Mineralienmuseum** and **Historische Weiherschleife**, as well as the chance to sample the very best of German small-town culture.

The price is inclusive of the coach to Germany, 7 nights accommodation (single or twin room), breakfast and dinner, and entry to museums, institutes and field trips.

For more information or to book contact **events@gem-a.com**.

Price	**Single room** (1 person)	**Twin room** (2 people)
Member (Gem-A, NAG, BJA and GIA Alumni Association)	£1,455	£1,245
Non-member	£1,745	£1,495

All prices quoted are per person

Understanding Gems™

Visit www.gem-a.com

Editorial

Gems&Jewellery
April 14

Contents

Perception. Our business thrives and even depends on it. From the perception of what is 'good value' or what is a 'nice stone', right through to whether a sapphire is from Kashmir or not. In the latter case there may be scientific argument, but in the final analysis one is relying on a lab's experience and perception to arrive at an origin. Of course, this is why one gets differing opinions on the same stone.

Stone grading, whether of diamonds or of coloured gemstones, is at best a subjective discipline. In spite of many scientific instruments being introduced which can tell us about proportions and light return, clarity is still in the eye of the beholder, although one might be forgiven for thinking colour is now an objective choice with colour grading machines and increasingly advanced colour grading systems from Gemewizard and Gemworld. The problem is we have not yet developed a machine which can replicate the human eye satisfactorily, so we rely on the individual. At the recent International Gemmological Congress (IGE) and Federation for European Education in Gemmology (FEEG) conference in Madrid, the topic of diamond colour grading came up, and a seemingly non-PC comment was made that men and women grade colour differently. A cue for a potential riot I would have thought, had it not been for an affirmation of this by Menahem Sevdermish of Gemewizard. Ladies, you will be gratified to learn that you are in fact more accurate and consistent graders than men! You might think this is anecdotal hogwash, were it not for the fact that we had on hand a scientific paper from Manchester University outlining a study which came to this same conclusion. This is a subject which I think merits further research and I hope that it might be the subject of an article later in the year. Menahem will be speaking about colour at the Gem-A Conference in November (Saturday 1–Tuesday 4 November) and will, I'm sure, be happy to engage on this topic.

Does this make men redundant in colour grading? Interestingly, nowadays the majority of gemmology students are, almost universally, female. Contrast this with 50 years ago when a female student was a rarity. I remain to be convinced about such generalization, even if backed by scientific study. For a start there are so many variables to take into account, such as the frame of mind of the individual, their physical wellbeing — not to mention light sources. Light sources, now there's another hot potato… Another time perhaps.

James Riley
Chief Executive Officer

Cover Picture
Turbidity in hessonite garnet. Photo by Gary Roskin.
See *Gems and Minerals*, pages 8-12.

Published by
The Gemmological Association of Great Britain (Gem-A)
21 Ely Place, London EC1N 6TD
t: +44 (0)20 7404 3334
f: +44 (0)20 7404 8843
e: editor@gem-a.com
w: www.gem-a.com
Registered charity no. 1109555
Copyright 2014 ISSN 1746-8043

Editor
James Riley

Production Editor
Georgina Brown

Advisory Board
Mary Burland, Harry Levy

Design and Production
Zest Design +44 (0)20 7864 1504

Gem news

We report on an unsold pink diamond, an 'outstanding' vivid blue one, the opening of the Panama Gem & Jewelry Centre and the recent CIBJO seminar.

'Pink Dream' aptly named

Sotheby's, in its annual report, has announced that it has bought back the 'Pink Star' diamond, which had fetched a world record price in November last year, after its buyer defaulted on the payment. The 60 ct oval-cut flawless pink stone sold at Sotheby's Geneva for $83 million, making it the most expensive diamond ever sold. New York-based diamond cutter Isaac Wolf outbid three rivals and purchased the stone on behalf of investors who gave their word to supply the funds for the purchase. After the bid was accepted Wolf renamed the diamond 'Pink Dream'.

In a post-earnings conference call, the auction house said it reversed the related commission revenue as a result of the buyer default and recorded the pink diamond in inventory at a value of about $72 million. "We are currently in discussions with the buyer, while also considering other alternatives," Patrick McClymont, Sotheby's CEO, said on the call with analysts. "In the meantime, we are quite comfortable with our valuation, and see real value in owning the diamond at this price." The auction house paid the seller the guaranteed $60 million and is holding the stone for the time being.

Panama gem centre names directors

The launch of the Panama Gem & Jewelry Center, which took place in Panama City on 17 and 18 March, opened with the announcement by the Panama Diamond Exchange of its founding directors and members.

The hon. founding chairman of the PDE Board of Directors is Eli Izhakoff. The other directors include Ernest Blom, president of the World Federation of Diamond Bourses; Gaetano Cavalieri, president of CIBJO; Avi Paz, president of the World Diamond Council and Erez Akerman, president of the Panama Diamond Exchange.

Founding PDE Members include Maxim Shkadov, president, International Diamond Manufacturers Association; Jeffrey H. Fischer, hon. president, of IDMA and DMIA and a member of the Board of Governors of the Gemological Institute of America; Reuven Kaufman, president, Diamond Dealers Club of New York; Ronnie Vanderlinden, president, Diamond Manufacturers and Importers Association of the United States (DMIA); Alex Popov, president, Moscow Diamond Bourse; and Mehul Shah, president, Indian Diamond & Colorstone Association (IDCA).

The Panama Gem & Jewelry Center is the first designated trading centre for the diamond, coloured gemstone and jewellery trades in a region that includes South and Central America, Mexico and the Caribbean.

Vivid blue diamond sparkles at Israel show

The inaugural International Rough Diamond Week (IRDW) kicked off on 9 March in the Rough Diamond Trading Hall of the Israel Diamond Exchange (IDE). Cora International LLC honoured the request of the Israel Diamond Exchange to display an exceptional vivid blue 29.6 ct diamond during the week on the rough diamond trading floor.
The vivid blue stone was recovered by Petra Diamonds Limited PTY at the Cullinan Mine in South Africa and purchased by Cora International for $25.5 million through a highly competitive sale process.

"This stone, an outstanding vivid blue with extraordinary saturation, tone and clarity, is the pinnacle of the rough diamonds that can be viewed this week on the rough diamond trading floor," Schnitzer said. "We're very happy to have it on display and thank Cora International for its kind cooperation."

During the IRDW, rough goods worth many hundreds of million dollars were present on the trading hall floor for viewing. Some 400 buyers registered for viewing and bidding at the rough diamond tenders of the Israel Diamond Exchange.

NY CIBJO seminar focuses on CSR

A CIBJO Luncheon Seminar held in New York on 9 April focused on the past 14 years of achievements toward achieving the UN's 8 Millennium Development Goals (MDG), focusing especially on the jewellery and precious commodity mining sectors.

In particular the seminar looked at MDG#8, which concerns partnerships involving governments, civil society, academia and the private sector, in their joint efforts to achieve the MDGs and implement the UN's Post-2015 Development Agenda.

A review was made of a number of CSR programmes that have addressed one or multiple MDGs, such as: the eradication of extreme poverty, basic education, maternal health, food and water supply, and HIV/AIDs. In this respect, CIBJO members shared how they developed jewellery and mining sector awareness, involvement and contributions to MDGs and CSR including technology and innovation. A case study was presented by the Tanzanite Foundation on its community achievements related to the MDGs and the UN Development Agenda.

Gem-A events

Gem-A AGM
Thursday 12 June — 17:30–20:00
Gem-A Headquarters,
21 Ely Place, London EC1N 6TD

Gem-A Conference 2014
Business Design Centre, Islington
1 and 2 November: Conference
3 November: Seminars
4 November: Natural History Museum visit

Confirmed speakers include:

- Edward Boehm GG CG from Rare Source
- Bruce Bridges from Bridges Tsavorite
- Brian Cook from Nature's Geometry
- Thomas Hainschwang FGA from GGTL Laboratories
- Alan Hart FGA DGA from the Natural History Museum
- Dick Hughes FGA from Lotus
- Dr Menahem Sevdermish FGA from GemeWizard
- Chris Smith FGA from American Gemological Laboratories (AGL)

Gem Central evenings

Gem Central evenings take place once a month, at the Gem-A Headquarters (address as above) from 18:00–19:30. Booking is essential.

Natural or synthetic?
Monday 14 April
Join our gemstone challenge and test your skills.

From Mandalay to Mogok (Specialist evening) with Peter Grumitt
Monday 19 May
Following his recent journey to Myanmar, Peter Grumitt from Apsara Gems will give a talk on rubies from this area.
£5 for Gem-A members and Gem-A students; £10 for non-members

Organic or imitation?
Monday 16 June
Join our gemstone challenge and test your skills.

All Gem Central evenings (except Specialist evenings, priced separately) are free for Gem-A members and Gem-A students; £5 for non-members.

Gem-A Workshops

Notes on workshops
Our range of introductory 'Understanding' workshops are ideal for jewellers with no gemmological background, or for anyone who needs a refresher. The intermediate 'Investigating' workshops are for gemmologists and jewellers with gemmological knowledge.

Investigating ruby, sapphire and emerald
Friday 9 May 2014
Gem-A Headquarters, London
Amanda Good FGA DGA will host an informative practical day covering all aspects of these beautiful and important gemstones. Attendees will begin by looking at the properties of natural ruby, sapphire and emerald, followed by their treatments (including lead-glass filling of ruby), their simulants and synthetics. Participants will handle and examine a wide range of these stones from Gem-A's extensive collection.
Gem-A/NAG/BJA Members and Gem-A Students: £110, Non-members: £130

Understanding diamond grading
Friday 11 April 2014
Gem-A Headquarters, London
This specialist workshop focuses on the key aspects of diamond grading, giving a unique insight into the 4Cs. Led by Gem-A's experienced diamond tutor (with prior retail experience), Claire Mitchell FGA DGA, participants will be guided through the underlying theory before seeing the practical side of cut, colour, clarity and carat weight on both loose and mounted diamonds.
Gem-A/NAG/BJA Members and Gem-A Students: £100, Non-members: £120

Show Dates

Gem-A will be exhibiting at the following shows:

JCK Las Vegas
Booth L116, Mandalay Bay
30 May – 2 June

International Jewellery London (IJL)
Stand J31, Olympia London
31 August – 2 September

Hong Kong Jewellery & Gem Fair
Booth 3M046, Hong Kong Convention and Exhibition Centre
15 – 21 September

Gem-A Midlands Branch

Organics
with Maggie Campbell Pedersen FGA
Friday 25 April
For more information please contact the Midlands Branch chairman, Georgina Kettle FGA DGA, at georgekettle@hotmail.com.

The Scottish Gemmological Association

Conference 2014
Friday 2 May – Monday 5 May
Peebles Hydro Hotel, near Edinburgh
For details of the programme please visit www.scotgem.co.uk/SGAConference2014. To book please contact Catriona McInnes at scotgem@blueyonder.co.uk.

Cartier: Style and History

Sabrina O'Cock FGA DGA visits the recent Cartier exhibition at the Grand Palais, Paris.

The Cartier: Style and History exhibition, held from 4 December 2013 – 16 February 2014, was a grand affair. The largest exhibition to be devoted to Cartier, the palatial Salon d'Honneur was filled with nearly 600 glittering jewels and precious objects from the jewellery house. The curators of the exhibition, Laurent Salomé and Laure Dalon, stated that it was unusual for the museum to dedicate an exhibition to a large company that is still trading, but while Cartier is a retailer, it also shares two vital attributes with the usual museum pieces: heritage and virtue.

One of the exhibition's objectives was to push boundaries in the history of art field to include jewellery and, in doing so, elevate the status of this particular craft to equal that of those decorative arts already recognized for their artistic integrity. The other was to showcase the complex history of Cartier from the Second French Empire to the 1970s and analyse its contribution to the evolution of style.

Cartier began buying back its classic pieces and building the Collection Ancienne Cartier in 1983, which now boasts over 1500 pieces. In addition to loans from private individuals and other institutions, pieces from this collection contributed a major part of the exhibition. Thanks to this and Cartier's meticulous records of client purchases, as well as archival material from its workshops, the exhibition was so much more than a chronological display of spectacular pieces.

In mesmerizing fashion, the exhibition succeeded in bringing guests into the world of the jewellery designers and their inspirations, vogue ideas and technical challenges, as well as into the world of Cartier's illustrious and exacting clientele. As the revolving cabinet greeting visitors brought glistening tiaras to life, so too did well-chosen contextual material breathe life into each piece.

2: Duchess of Windsor's 'Panther' pin (1949), featuring two yellow pear-shaped diamonds for eyes, a 152.35 ct Kashmir cabochon sapphire and cabochon sapphire spots. © Cartier.

1: The 'Bérénice' tiara, featuring a 141.13 ct engraved natural emerald. V. Wulveryck © Cartier.

Designer sketchbooks and studies, workshop moulds, historical dress, fashion illustrations and photographs of famous owners in their Cartier jewels wove a glorious ribbon through the exhibition, documenting many aspects of Cartier's creative process and contemporary life. One often hears the expression 'if only jewels could speak' and here, being privy to so many behind-the-scenes artifacts, it felt as if they had a distinct voice.

From a gemmological perspective the exhibition was full of delights. Divided both chronologically and thematically, the exhibition took visitors on a journey through the changing scenes of the early twentieth century, and every so often a particularly breathtaking jewel would gather a devoted congregation. The Bérénice emerald tiara (**1**) was one such delight which held the crowd captivated. The engraved 141.13 ct emerald, a naturally hexagonal stone of Mughal origin, was set into a striking geometric scrolling diamond tiara which was easily convertible into a brooch. Previously known as the Taj Mahal emerald, it was renamed for the Exposition Internationale des Arts

Décoratifs et Industriels Modernes in 1925, an exhibition of contemporary applied arts at the forefront of design which gave its name to the roaring new style, Art Deco. A photograph of the centrepiece of Cartier's display at the 1925 Exposition reveals the Bérénice emerald then set in an elegant shoulder necklace. Beside this photograph, from the same year, was Cartier's original design for this necklace in graphite, India ink and gouache, and a fashion plate from *La Gazette du Bon Ton* showing this very shoulder ornament and matching parure on Bérénice personified.

Displayed majestically in its own cabinet, and quite unreal in stature, was Marie of Romania's sapphire, a 478 ct unheated blue sapphire from Sri Lanka. Acquired by Cartier in 1913, it was shown at the San Sebastian exhibition in 1919, where it commanded the attention of Spanish royalty. Bought in 1921 by Ferdinand of Romania, it was often worn on a long chain (also by Cartier) by Queen Marie and can be seen in a 1924 portrait by Philip Alexius de Láslò, held in the Museul National Peles in Romania. It is one of the largest cut sapphires ever documented.

Of equal fascination, viewers encountered the hemispherical 152.35 ct cabochon sapphire of Kashmiri origin, set as the pedestal of the Duchess of Windsor's famous panther brooch, 1949 (**2**). The Williamson diamond, a 23.60 ct round brilliant-cut pink diamond from the Mwadui mine in Tanganyika, gleamed from within a flower brooch, 1953, belonging to Queen Elizabeth II and worn gracefully in a photographic portrait by Marcus Adam. Grace Kelly's engagement ring (1956) was also on display — an elegantly simple emerald-cut diamond weighing 10.47 ct set between two baguette-cut diamonds (**3**), which surely touched a few heartstrings.

In 2011 Elizabeth Taylor's famous Peregrina pearl earned world headlines when it sold for $11.8 million (£7.6 million). Although the pearl was not on show, Cartier's 1972 design for the necklace the pearl would be mounted in was, and annotated with Elizabeth Taylor's handwritten instructions. The Maharaja of Patiala's ceremonial necklace (**4**) from 1928 was also on display. The necklace originally featured the De Beers diamond, a 234.69 ct yellow diamond and

3: Grace Kelly's 10.47 ct diamond engagement ring. © V. Wulveryck / Cartier.

4: Parade necklace created by Cartier Paris for the Maharaja of Patiala in 1928. It is set with 2,930 brilliant-cut diamonds, two rubies and the De Beers diamond (234.69 ct). N. Welsh, Collection Cartier © Cartier.

the seventh largest in the world, set among 3000 diamonds and precious stones. The necklace disappeared at the end of the Raj, only to be rediscovered in a second-hand jewellery shop in London in 1998, missing the seven largest diamonds. Today these have been substituted with simulant stones but the necklace is in no way disappointing to see.

Pink conch pearls, natural pearls, rubies and fancy intense coloured diamonds were some of the other exquisite gemstones that illuminated the cabinets. The vast array of gems shown set in objects, including coral, onyx, turquoise, mother-of-pearl and agates, reflected Cartier's eclectic style. Cartier's exoticism permeated contemporary style beyond jewellery, as seen in fashion illustrations from *La Gazette du Bon Ton*.

Perhaps the most astonishing exhibition pieces of all, however, were the small-scale Art Deco diamond- and gem-set brooches, unassuming in size but proud in their finite perfection, demonstrating the unparalleled technical skill and aesthetic excellence of Cartier's craftsmen.

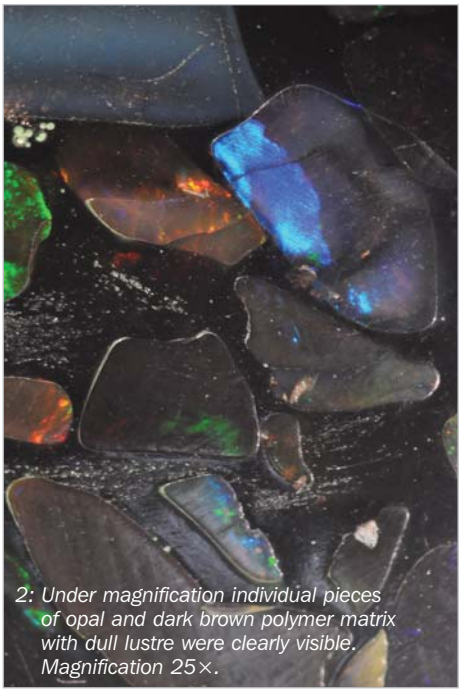
The exhibition successfully demonstrated Cartier's complex history as a force of pioneering artistic innovation, and affirmed jewellery as an art form. The medium may be luxurious and independently beautiful, but the craft is complex and innovative, and the creativity reveals fascinating layers of human thought and imagination.

About the author
Sabrina O'Cock FGA DGA is a jewellery specialist at Bonhams auction house.

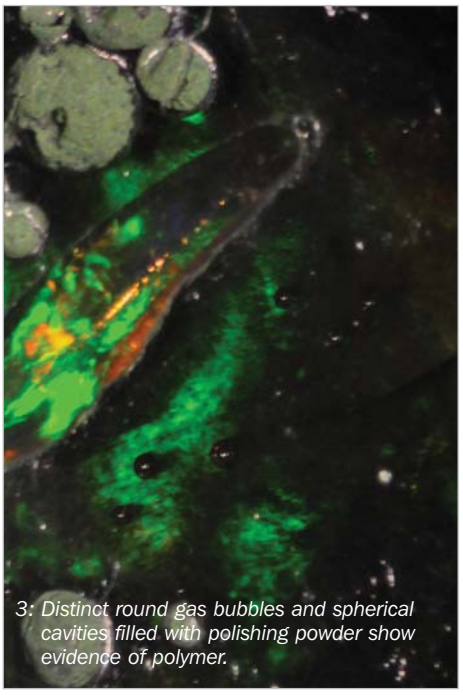
Innovative opal composite

Meenu Brijesh Vyas FGA reports on an unusual composite seen recently by the Gem Testing Lab in Jaipur, India.

1: The composite weighing 186.43 ct, comprised of chips of opal bonded together with polymer matrix. Photo by Gagan Choudhary.



2: Under magnification individual pieces of opal and dark brown polymer matrix with dull lustre were clearly visible. Magnification 25×.



3: Distinct round gas bubbles and spherical cavities filled with polishing powder show evidence of polymer.

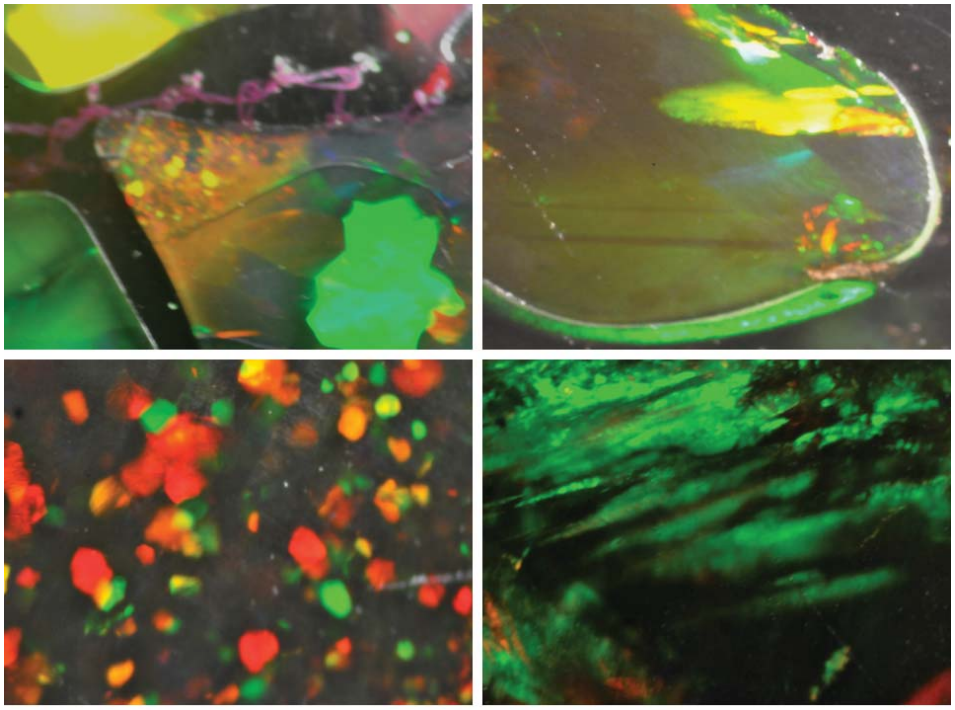
The submitted specimen was a dark brown, round cabochon showing attractive play of colour (**1**), measuring 54 × 53.5 × 12 mm and weighing 186.43 ct — a beautiful composite made up of small pieces of opal held together in a polymer matrix.

Visual appearance

The initial appearance indicated that the stone could be natural opal with mother rock (boulder type), but close examination revealed small pieces of black opal held together in polymer matrix. The stone was dark brown in colour and exhibited a waxy to dull vitreous lustre, while the portion of polymer matrix showed even duller lustre — a feature commonly associated with polymers. The pieces of opal in the specimen showed bright and vivid play of colour, and were the main attraction of the opal composite.

Microscopic examination

Examination of the specimen under a microscope using fibre optic illumination revealed individual opal chips with a dull dark brown matrix (**2**). Almost all the opal



4: Clouds, streaks and irregular patches of colour were consistent with natural opal.

chips displayed vibrant play of colour, while the rest of the area displayed trapped gas bubbles and the flow pattern of polymer matrix (**3**).

The opal chips were examined individually under a microscope to judge their origin. They were sufficiently different from their synthetic counterparts to identify them as being natural. All the pieces of opal showed natural type growth structure (**4**), including clouds, streaks and patches of colour. Small pieces of plastic netting were also observed in the specimen (**5**), possibly trapped during production.

Gemmological properties

Several standard gemmological tests were performed to identify the specimen. The refractive index was determined at approximately 1.45 by distant vision method. Measuring the specific gravity was not applicable in this instance. Under both long- and short-wave ultraviolet light the specimen remained inert overall. Previous lab experience has shown that polymer fluoresces under ultraviolet light, but in this composite the result was negative.

Conclusion

The composite is formed from chips of opal held together in a polymer matrix. Based on microscopic studies, the components or chips of this composite were identified as opal. Although the identification of this specimen was not difficult, awareness and careful observation of similar composites was necessary. There is no doubt however that it was a good example of innovation in the field of composites.

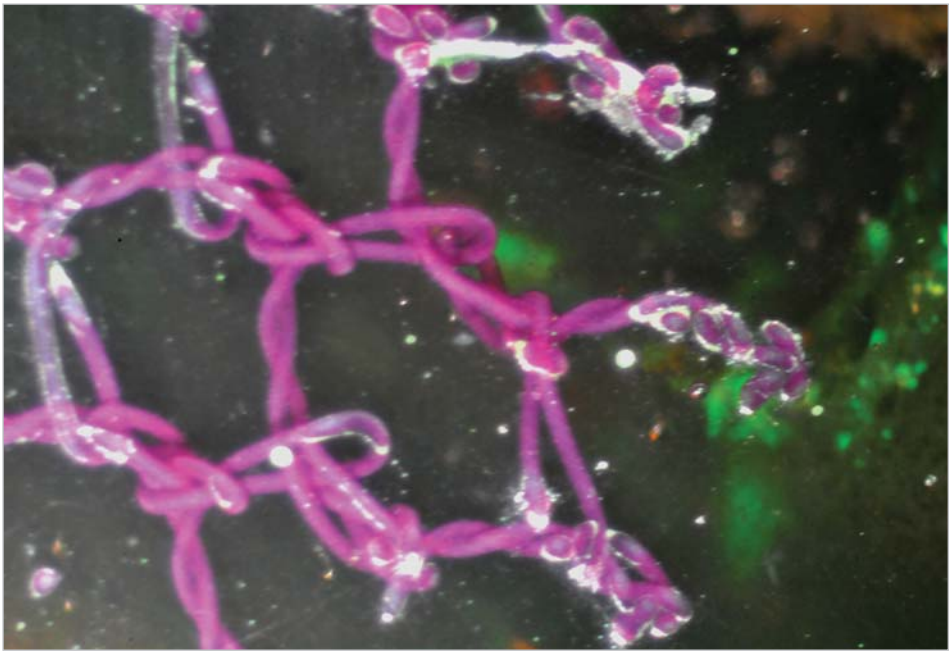
Further reading on composites

Other articles in *Gems&Jewellery* on composite stones reported by the Gem Testing Laboratory in Jaipur include beryl and glass (Spring 2010, Vol. 19, No. 1, p. 10–12), diamond and rock crystal (Autumn 2010, Vol. 19, No.3, p. 20–21), chalcedony (Winter 2010, Vol. 19, No. 4, p.28–30) and malachite (Autumn 2011, Vol. 20, No. 3, p. 3–5).

All photos by Meenu Brijesh Vyas, unless otherwise stated.

About the author

Meenu Brijesh Vyas has been assistant director of the Gem Testing Laboratory in Jaipur since 2003 and is currently involved in their testing and research activities.



5: Unusually, a piece of trapped plastic netting was observed in the opal composite.

Gem update

Gary Roskin FGA presents a selection of news and comments from his *Roskin Gem News Report*. This issue, we see donations to the Smithsonian; a unique tender from Rio Tinto; a time to go Herkimer hunting; the new ivory ban; the confusion with tanzanite, and the sight identification of hessonite garnet.

2: Csarite™, or turkish colour-change diaspore. Photo courtesy of Milenyum Mining.

Museum donations

Recent donations to the Smithsonian Institution's National Museum of Natural History's Gems and Minerals Collection represent unique localities for beautiful gems. Two in particular caught our interest.

Four Peaks amethyst

At this year's annual AGTA GemFair in Tucson, Arizona, the Smithsonian Institution once again brought a display of special items from the nation's gems and minerals collection to inspire and generate interest in possible donations to the museum. For the past several years there has been a prominent display of recently acquired — purchased and donated — gems and jewels, inspiring gem suppliers and jewellery designers to consider making their own donation.

1: The 10 ct Four Peaks amethyst trillion ring, inspired by the Alexander concave scalloped cut. Photo courtesy of John Parrish Photography.

It was only a few years ago that the Smithsonian Institution's Gems and Minerals Collection staff began an outreach programme to gem suppliers and jewellery designers to consider the United States' collection as a place to expose the public to the wonderful variety of gems provided by Mother Nature and the jewels created by gem and jewellery artists. For the most part, we think of a museum collection of gems and minerals as simply a mineral collection. But the curators here are actively searching for gem-set jewels and unique polished gems.

Two recent donations have been announced and they are great examples of what the collection is looking for, and the direction of its collection. The first is a uniquely American gem: the Four Peaks amethyst.

The ring (**1**) features an amethyst mined from the Four Peaks amethyst mine in Four Peaks, Arizona (elevation 7657 ft). It is recorded that the Spaniards who explored Arizona in the 1500s once worked the Four Peaks mine. Apparently, the gems found were of such excellent quality that they were sent to Spain where it has been reported that they became part of the Spanish crown jewels.

The Four Peaks amethyst mine is now privately owned, accessible only by hiking or helicopter. The donated amethyst was mined and cut in 2010 by Darryl Alexander from Arizona, with permission from brothers Mike and Jerry Romanella, Commercial Mineral Company, Inc., who have an interest in the mine. The ring was designed and created by Brenda Smith of Brenda Smith Jewelry, LLC, specifically for the Smithsonian Institution's National Museum of Natural History. It was in 2013 that Smith met with Russell Feather, Museum Specialist, and discussed the possibility of a contribution.

It is one thing to sell unique gems and jewellery, but it's a totally different feeling to have one of your pieces in a museum, and especially one like the Smithsonian. "I feel very privileged to have my design chosen to represent this very special gemstone from our country," notes Smith. "The full impact of this wonderful opportunity hasn't completely penetrated since it all happened rather quickly. However, I appreciate the recognition and opportunity."

For more information regarding Brenda Smith Jewelry, visit her website at www.brendasmithjewelry.com.

Csarite™ or Zultanite?

The second gem donation was uniquely Turkish: Csarite™, or Turkish colour-change diaspore (**2**).

Csarite™ is gem-quality, colour-change diaspore, actively mined at only one global source (that we know of) in the Anatolia Mountains of Turkey. Many of you will be

thinking: “But isn’t that Zultanite?” The answer is yes, but with an explanation.

It turns out that the two principals in the production and marketing of this unique gem have gone their separate ways, leaving the mine to one, and the previously faceted goods — and the trademark Zultanite — with another. Which is why the owner of the mine has created a new trademark name: Csarite™.

But whether you call it Zultanite or Csarite™, it is still colour-change Turkish diaspore. And the latest donation of the colour-change diaspore was presented, as was the Four Peaks amethyst, at the AGTA Tucson GemFair, and accepted by Dr Jeffrey Post, curator of the National Gem Collection, and Russell Feather.

“Large colour-change diaspore gemstones are rare, indeed,” stated Post. “The 159.33 ct cat’s-eye cabochon and 44.48 ct faceted oval are both significant upgrades to the collection, so we are very appreciative of the contribution.”

Murat Akgun, president of Milenyum Mining and owner of the mine added: “To our knowledge, currently there are fewer than 20 faceted Csarite™ gemstones in the world that have a weight of 40 ct and above. Given the rarity of this unusual gem, we feel the Smithsonian’s National Gem Collection is a fitting home for two of the few examples available in this size and quality.”

Rio Tinto: unique rough tender

Although it is now over, it is worth mentioning that Rio Tinto hosted its first rough diamonds tender for 2014, held in Israel and Antwerp from 9 – 28 March.

This particular Tender consisted of 124 lots of rough diamonds from the Argyle Mine in Australia, the Diavik Mine in Canada and the Murowa Mine in Zimbabwe, and showcased unique combinations of colourless and fancy coloured rough. The most notable diamonds included a 70 ct colourless diamond from the Diavik mine, several fancy and fancy intense yellows from all three mines, several large fancy dark brown diamonds and a range of extremely rare fancy pinks from Argyle, and several purple diamonds from the Diavik.

Patrick Coppens, general manager of sales for Rio Tinto Diamonds, said: “This tender offers an opportunity to view and bid for the full suite of Rio Tinto’s diverse diamond productions, for which there is continued strong global demand.” With the majority of Rio Tinto's rough diamond production sold in Antwerp to designated ‘Select Diamantaires’, these rare open tenders give others an opportunity to bid on goods that they wouldn’t normally see. This image of rough crystals gives us an opportunity to see some of these as well (**3**).

3: Parcel of rough crystals from the 2014 tender. Photo courtesy Rio Tinto.

4: Cubic zirconia (top) imitating colouring of tanzanite (bottom).

The unfortunate gift

Tanzanite should be a relatively easy identification, but, for some reason, it is all too often mislabelled. Because tanzanite is a softer gem material (hardness 6 to 7), it is fairly common to see rounded facet junctions on a finished gem. Rounded facet junctions, however, are typically associated with glass and plastic. Therefore, when jewellers look at the gem under magnification and see rounded facet junctions, the identification is too quickly made as glass. A quick peak around the gem should have revealed doubling of back facets, therefore eliminating glass as a possibility.

Lately, however, the opposite has been happening — only instead of hardness being considered, it’s simply the colour.

Gem Update (cont.)

Cubic zirconia can be made in almost any colour, and so the colour of tanzanite can easily be recreated (**4**). Recently, a client handed us a ring set with a beautiful tanzanite-coloured gem. Given as a gift, the client had been told it was tanzanite. We were given the opportunity to offer a third opinion. Yes, there were already two previous opinions who told the client that the gem was in fact not tanzanite. A quick refractive index showed the gem to be over the limits of the refractometer, therefore, the previous opinions were absolutely correct. The RI of tanzanite is around 1.69–1.70.

So what was it? Under the microscope, it was apparent that the hardness was very good as the facet junctions were nice and sharp, bruised but not worn. The second clue under magnification was the lack of doubling of back facets when looking in several directions. After a number of conclusive tests, the gem material was identified as CZ.

To make matters worse, the client's friend is a bench jeweller who had "gotten a very good price on a large parcel of tanzanites".

Hunting for Herkimers

A city in upstate New York between Syracuse and Albany, Herkimer is a wonderful source for the coolest doubly terminated quartz crystals (**5**).

Even though it is below freezing as we write this report, we know that the weather will certainly be changing for the better in the next few weeks, and that means it will be perfect to go to Herkimer and go 'diamond' mining. Well, not diamonds, but beautiful doubly terminated quartz crystals called 'Herkimer diamonds'. Around this time, during the 'rainy' Spring season, you have a very good chance of finding crystals just waiting to be picked up — those who were mining last year and who broke them out of the hard rock have left many of them scattered along the ground. The rain has washed them off and this of course makes them more visible. For the more adventurous, you can use the hammer (provided at the mine, along with safety glasses and a plastic bag for all of your finds) and start banging on the rocks to find your treasure. It's great fun. Whether you can get away just for a day or two, or maybe a long weekend, you will have a blast.

5: 'Herkimer diamonds' — rock quartz crystals. Photo Gary Roskin.

The Herkimer Diamond Mine is located on the banks of the West Canada Creek and is one of the finest Kampgrounds of America (KOA) campsites in the country. You can camp out, spend some time by the river and go gem mining. Dr Renee Shevat, owner of the Herkimer Diamond Mine, would love to have you come and dig. Be sure to log onto their website at: www.herkimerdiamond.com.

Ivory — a new U.S. ban?

While it sounds like a new direction, the latest ivory ban in the U.S. could simply be nothing more than rhetoric. It is a noble cause for the federal government to eliminate the illegal trafficking of elephant ivory, but there is not much new in the press release issued by the United States government (see box) that will make a significant difference. Individual states' copy-cat laws like the bills introduced in the Hawaii legislature have the local collectors, along with local and Alaskan tradesman, worried that the possible ban on all sales of all ivory could destroy small businesses.

Brenda Reichel Keanu, well-respected appraiser and retail jeweller in Honolulu, Hawaii, told us that the national ban will affect the collectors' market in Hawaii. "There are two Bills going through our legislature," notes Reichel. "One is SB2024 and the other is HB 2183." These bills would effectively ban all sales and purchases of all ivory. Reichel attended the hearing on 25 February, stating: "My problem with these bills is that, here in Hawaii, we had a long and well established jewellery firm called 'Mings'. Very collectable. Little old ladies in their 80s and 90s still sell their 'Mings' pieces or give them to their kids." Because there is little or no proof of age of ownership, these pieces would now become illegal to sell or to own.

Reichel demonstrated for the legislature an easy identification of ivories, and asked them to reconsider banning all ivories. She also brought up the fact that most consumers who had purchased or were given ivory jewellery have no proof of ownership. After a day of testimony, both bills died in the legislature.

The Ivory Ban

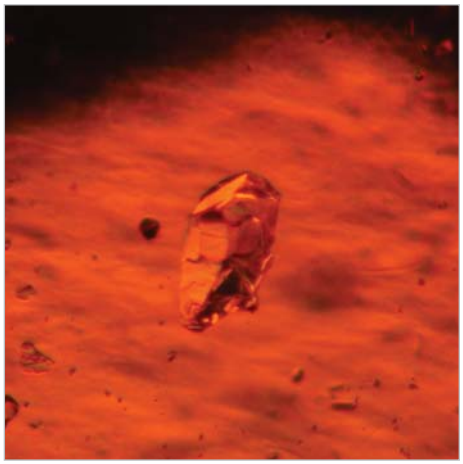
The White House issued the following press release regarding the proposed ivory ban:

"Today we are also announcing a ban on the commercial trade of elephant ivory, which will enhance our ability to protect elephants by prohibiting commercial imports, exports and domestic sale of ivory, with a very limited number of exceptions. This ban is the best way to help ensure that U.S. markets do not contribute to the further decline of African elephants in the wild.

"To begin implementing these new controls, federal Departments and Agencies will immediately undertake administrative actions to:

- *Prohibit Commercial Import of African Elephant Ivory:* All commercial imports of African elephant ivory, including antiques, will be prohibited.
- *Prohibit Commercial Export of Elephant Ivory:* All commercial exports will be prohibited, except for bona fide antiques, certain noncommercial items, and in exceptional circumstances permitted under the Endangered Species Act.
- *Significantly Restrict Domestic Resale of Elephant Ivory:* We will finalize a proposed rule that will reaffirm and clarify that sales across state lines are prohibited, except for bona fide antiques, and will prohibit sales within a state unless the seller can demonstrate an item was lawfully imported prior to 1990 for African elephants and 1975 for Asian elephants, or under an exemption document.
- *Clarify the Definition of "Antique":* To qualify as an antique, an item must be more than 100 years old and meet other requirements under the Endangered Species Act. The onus will now fall on the importer, exporter, or seller to demonstrate that an item meets these criteria.
- *Restore Endangered Species Act Protection for African Elephants:* We will revoke a previous Fish and Wildlife Service special rule that had relaxed Endangered Species Act restrictions on African elephant ivory trade.
- *Support Limited Sport-hunting of African Elephants:* We will limit the number of African elephant sport-hunted trophies that an individual can import to two per hunter per year."

6: The cushion-cut hessonite garnet. Photo Gary Roskin.

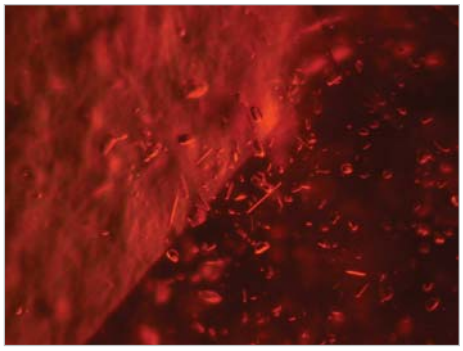


6a: The appearance inside the hessonite is as if the trapped crystals were somehow caught up in a storm of growth. Magnification 65×.

Some gems are easy

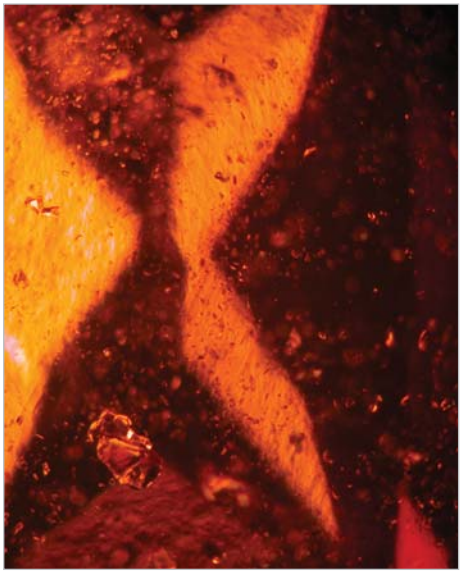
There are some materials that are easy to identify and hessonite garnet is one of them.

John Koivula writes in his *Photoatlas of Inclusions in Gemstones: Volume 2*, that "Often, one particular mineral, or a specific ensemble may so exclusively single out its host gem that no further test is necessary to identify the latter." The second example in the list of gems reads: "Roiled appearance caused by mosaic structure in combinations with myriads of apatite and calcite crystals in orange-brown to brown-red hessonite…" We looked at the following gem and immediately knew we were indeed looking at hessonite.



6b: Everywhere you look, the hessonite is packed full of small, low relief, round, elongated crystals, along with needle-like inclusions. Magnification 65×.

Gem Update (cont.)



6c: You can almost feel the turbidity in this hessonite — it was impossible to focus on the back facets. Magnification 45×.

The medium-dark, strong, saturated, brownish-orange elongated cushion cut (**6**) was found in a plastic bag, along with other yellow and orange gems such as citrines and Mexican opals. Looking for something interesting, one second under the microscope and we knew what it was. There's just something about a gem that allows you to identify it within a moment of looking into its interior. It has now received its own separate gem paper.

Of course, this reminds me of a time back in 1977 when Richard Liddicoat, then president of GIA, on his morning coffee break, came into the laboratory to rummage through the 'stones drawer' — a drawer full of donated loose faceted gems just waiting to be identified and placed into student stone sets. One of the lab staff gemmologists had placed a client's 3 ct demantoid garnet into the mix, just to see if Liddicoat would find it. And as you can imagine, it didn't take more than a minute before we heard, "Hey, who put the demantoid in here?" Nothing really difficult in spotting a 3 ct medium dark yellowish-green round brilliant showing off a bit of dispersion, with a nice fibrous inclusion — the classic 'horse tail' — smack dab in the middle of the table. No further tests necessary.

All photos by Gary Roskin unless otherwise stated.

About the author
Gary Roskin FGA is the author of *Photo Masters for Diamond Grading* and hosts the online gem news magazine *The Roskin Gem News Report*. For more information visit www.roskingemnews.com.

Craftsmanship and Design Awards 2014

From left-right: Gem-A CEO James Riley, Joanna Fronczak-Jabbal, Victoria Barker and Prime Warden Richard Agutter.

Each year the Goldsmiths' Company celebrates some of the up-and-coming designers from the UK jewellery industry by offering them the chance to enter the Craftsmanship and Design Awards, a national competition focused solely on new design talent. The competition culminates in a glamorous award ceremony at Goldsmiths' Hall – an opportunity for entrants to showcase their work to a host of industry professionals. To celebrate this event, each year Gem-A awards two Diamond Scholarships to the individuals who demonstrate a passion for gems and gem-set jewellery in the designs of their pieces. Selected by members of the Goldsmiths' Council and experts from Gem-A, winners of the scholarship receive a free place on Gem-A's Diamond Grading and Identification course, giving them a chance to further their knowledge of diamonds and the diamond industry.

This year's winners, Victoria Barker and Joanna Fronczak-Jabbal, displayed an inventive use of gems in their designs and successfully demonstrated in their personal statements how winning the scholarship would assist in their personal and professional development and benefit their design and craftsmanship skills.

Victoria Barker of Jerboa Jewellery was selected for her outstanding use of crystals in her piece (right).

Pearl and Crystal Neckpiece by Victoria Barker

The intricacy of Victoria's design impressed the judges, as did the forethought applied to her application. Judges were also extremely impressed with Victoria's personal statement, which explained how winning the scholarship would be the first step in making the most of her industry contacts and in generating interest in her designs from companies overseas. It was this focus on the future of her designs and career that made Victoria a strong candidate for the award.

The Reign of Stones by Joanna Fronczak-Jabbal

Upon the presentation of the award Victoria said: "As someone with a lifelong love of gemstones, coupled with a passion for materials and beauty, the course will bring me another step closer to realizing my designs in precious gems and metals." She continued: "I feel that a deeper understanding of diamonds in all their breath-taking glory will lead to a greater confidence in my designs. Jerboa Jewellery is a young brand, still finding its feet in many ways, but has always prided itself in its integrity. This applies to our designs, our materials and, most importantly, the way we deal with our clients. Having a chance to take this course can only help improve these key elements."

Joanna Fronczak-Jabbal, from Birmingham-based Weston Beamor Ltd, was selected on the basis of her stunning 2D pastel design, entitled 'The Reign of Stones' (above). Although these designs had yet to be realized, the judges saw potential in Joanna's vision. An elaborate and sophisticated combination of gemstones set in silver, her pieces reflect the natural beauty of the peacock's plumes, using coloured stones to create a stunning rainbow effect. Joanna's personal statement conveyed her enthusiasm for both gemstones and diamond – and emphasized that the place on the Diamond Scholarship would give her a step toward studying them both more closely.

Joanna said: "I was delighted to receive the scholarship… as an emerging jewellery designer and craftsman my goal is to establish myself as a designer who creates pieces from precious materials and gemstones. I believe that to be a good designer I need to have a deep understanding and respect for all the materials which I will work with and I believe this is what the Gem-A Diamond Scholarship will give me. It is a privilege and a huge motivation for future work and personal development."

Gems&Jewellery would like to congratulate both Victoria and Joanna on their awards and wish them all the best with their scholarships.

Instruments

The busy laser

Harold Killingback FGA describes how the fluorescence effect caused by the beam of a violet-blue laser pointer can be used to demonstrate birefringence in calcite.

Jack Ogden has discussed applications for laser pointers in gemmology[1], where he praised the usefulness of blue and violet-blue lasers for exciting fluorescence in certain gem materials. He was dismissive of the red laser since, as Stokes* had observed, the wavelength of fluorescent light is always longer than that of the radiation which excited it. Therefore, even if a red laser could excite fluorescence, this would be at a wavelength invisible to the human eye. The red laser pointer can, however, be helpful in demonstrating the path of a light ray when it interacts with a gem material. It has even had the honour of being featured in this role on the front cover of an issue

1: Double refraction by a rhombohedron of Iceland spar.

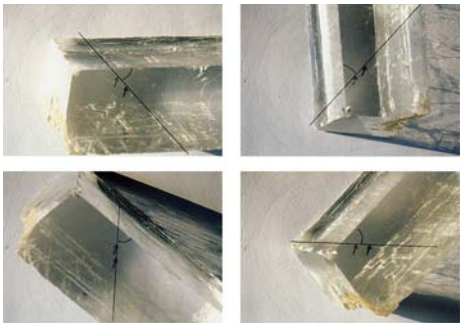
of *Gems&Jewellery* (August 2007, **16**(3)). The path of a laser beam through a crystal can, however, be made visible if the light is of a wavelength which can cause fluorescence. In the experiment described here, a violet-blue laser is directed through calcite. But first: a reminder of optical effects in this material.

** George G. Stokes, after whom the Stokes shift was named.*

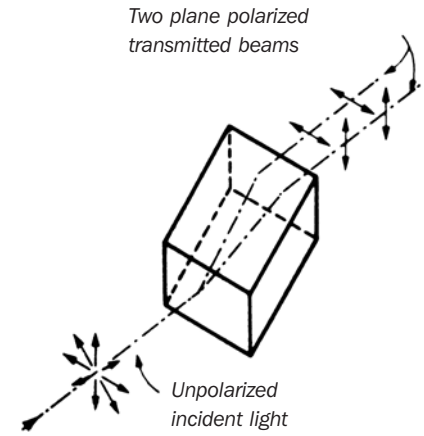
Calcite

The softness of calcite (it is the reference for point 3 on the Mohs' scale of hardness), together with its easy cleavage, make it unsuitable as a gem material, but it does have an established place in the teaching of gemmology. The transparent variety, Iceland spar, which is readily obtainable as cleavage rhombohedrons, demonstrates well its high double refraction (0.172, negative); **1** shows the doubling of 3 mm typescript through a calcite thickness of about 26 mm. A stereoscopic view would show that the images are at different apparent depths, the one associated with the ordinary ray being the closer because its RI, 1.658, is the higher.

When a single dot is viewed through the crystal and the block is rotated, the two images rotate also. In **2** the calcite is over an arrow rather than a dot, so as to indicate orientation; the view is through a calcite thickness of about 50 mm, the width of the rhombohedron. As the crystal is turned about the arrow, the two images of it remain pointing in the same direction. It is interesting to note, however, that the line between the heads of the arrows, turns with the crystal and remains at a constant angle of about 50° to its edges.

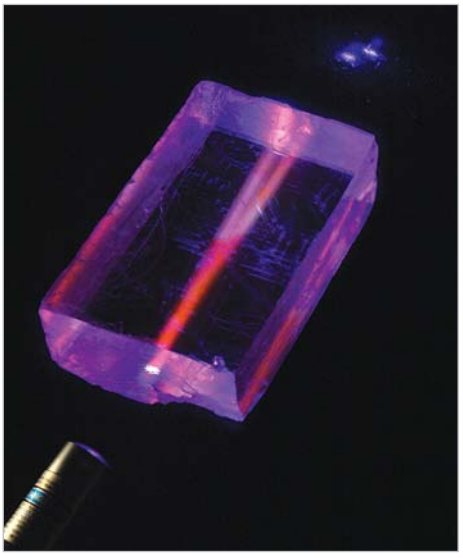


2: Variation of images according to orientation.



3a: A text book ray diagram for calcite.

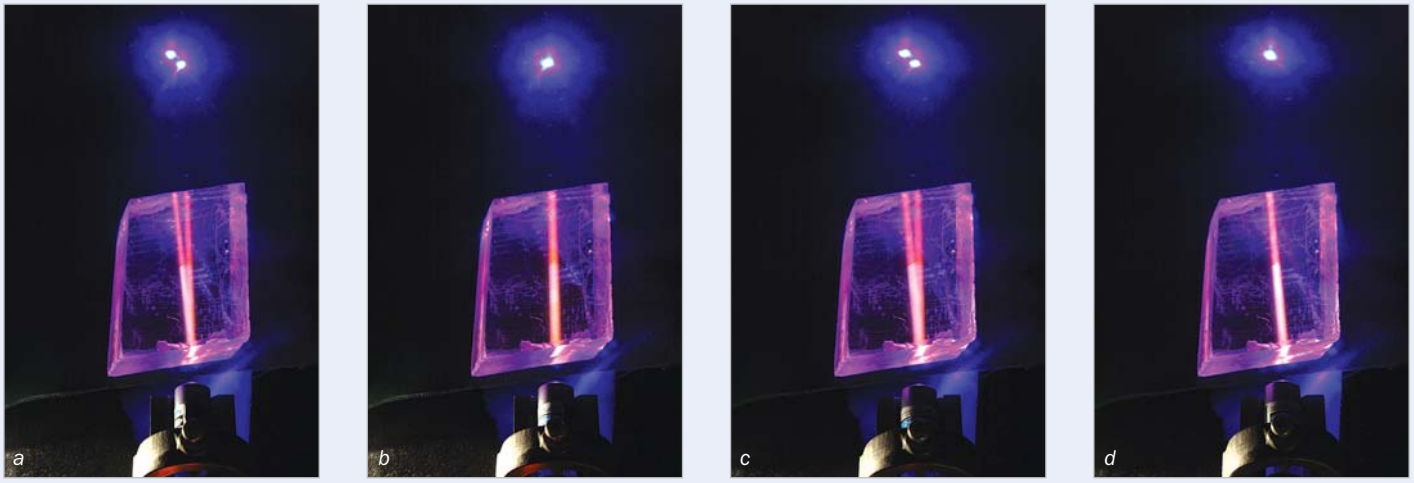
Calcite fluoresces orange under short-wave light — the brightness and exact colour is variable and is influenced by the wavelength of excitation.



3b: Photograph of the ray path.

Use of 405 nm violet-blue laser

The ray path diagram is shown in **3a** as it appears in many gemmology text books[2]. A similar view is shown in **3b**, a photograph of the ray path made visible by fluorescence. The laser pointer, in the lower left of the image, shows the direction of the incident ray. The light travels about 76 mm through



4(a–d): Effects due to polarization of the laser beam.

the length of the crystal, the resulting separation of the parallel emerging rays being about 9 mm.

The two rays within the calcite (and after leaving it) are polarized — the plane of one being at right angles to that of the other. Laser beams are also polarized, so rotating the pointer, but leaving everything else unchanged, results in first one ray, then the other, being extinguished as shown by the series in **4**. The pointer rests on a V-block, which keeps its axis in the same direction while leaving it free to be rotated. Here, the pointer has been turned by about 45º between shots. The background, blue-grey velvet for low reflectivity, has been folded upwards forming a screen on which the emergent beams will be shown. In **4a** there are two rays with two bright spots, while in **4b** there is one ray and one spot, then two again in **4c** and finally, in **4d**, the other ray and spot are on their own. Two rays occur when the plane of polarization of the laser beam is midway between the planes acceptable in the calcite; then a component of the incident beam can be accommodated in each plane of the crystal.

In **5**, which shows the view more neatly along the laser beam, it appears as if the (invisible) incident beam divides into three rays on entering the end face of the calcite. Nevertheless only two rays are visible through the top face and there are only two bright spots on the background cloth. I cannot explain the triple ray effect. Other photographs of it that I have taken do show a faint third light spot on the back cloth. This could, however, be from an internal reflection.

In this particular specimen of Iceland spar, it is apparent that there is inhomogeneity of the phosphor distribution. At one end, the luminescence is a reddish orange, but further along it becomes more yellow.

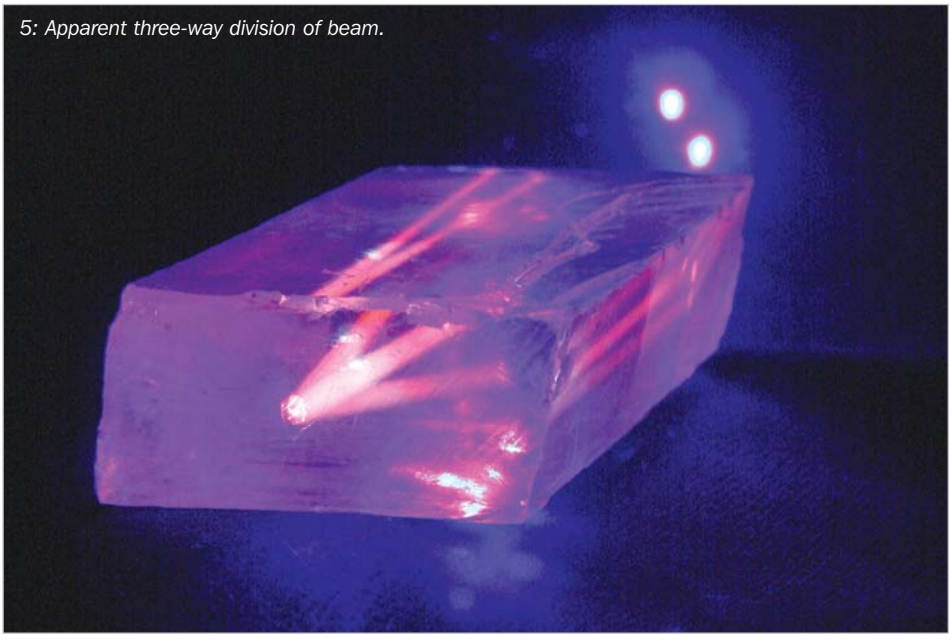
Conclusion

I found that having the ray path made visible by means of fluorescence gave a helpful insight into what was happening. I hope this technique will be of use in the teaching of gemmology. If nothing else, it produces very beautiful effects.

References

1. J. Ogden, 2013, *Gems&Jewellery*, **22**(3).
2. R. Webster, 1995. Revised P. G. Read. *Gems*. 5th Edn. Butterworth-Heinemann, Oxford. p. 668, Fig. 30.16.

All photographs by Harold Killingback.



5: Apparent three-way division of beam.

Hands-on gemmology

Yellow sapphires

Grenville Millington FGA investigates a parcel of yellow sapphires.

1: Yellow sapphires, ranging from 1.22 ct to 7.44 ct.

Yellow sapphires of 35 or more years ago mainly came commercially from Sri Lanka and, for the most part, were rather light in colour. A few stronger-coloured stones came from Australia, but, on the whole, this colour of sapphire was not a common sight. Then heat treatment in the early 1980s became the big change that not only hit 'blue' sapphires, but also brought about an increase in the attention given to yellow sapphire due to the much stronger yellow to golden colours available after this treatment.

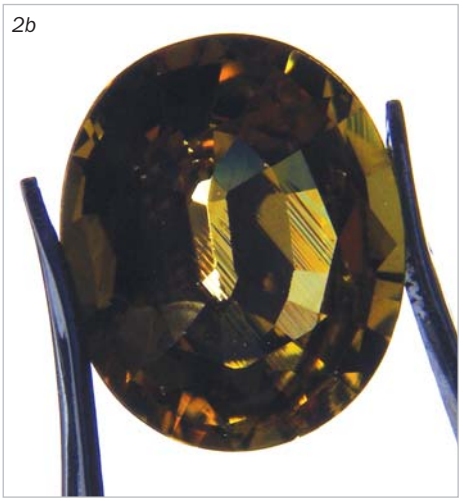
After the exploitation of corundum of various colours from the East African regions in the late 1980s, it was only to be expected that heat treatment would be applied to these stones as well. The yellow or yellowish brown East African sapphires did not disappoint, with some splendid, strong to vivid shades of golden yellow becoming available. Also, with yellow sapphire being a main gem of Indian astrology, this stone became widely seen in the market place.

A potential problem of this heat-treated golden sapphire is that it looks very much like the standard, flame-fusion synthetic sapphire that has been around since long before this modern heat treatment.

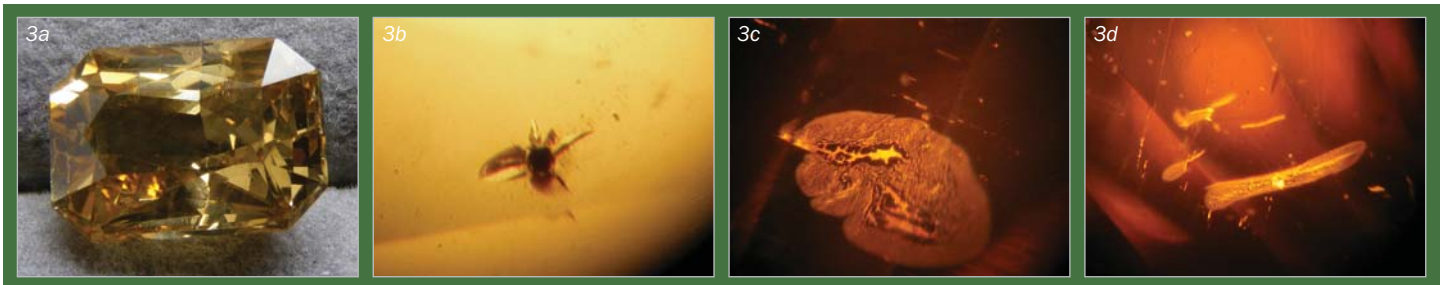
I, like others, have come across yellow sapphire fairly regularly since the 1970s, and I have been extremely grateful when an internal feature of the natural stone has made itself known to me, as the synthetic version is notoriously difficult to detect without immersion in methylene iodide and looking down the optic axis under a microscope to detect the Plato lines effect.

It was therefore a rare opportunity that presented itself when I was asked to provide 'authenticity certificates' for 41 yellow sapphires. It was thought, but not fully confirmed, that all the stones were from East Africa. As is usual with requests from within the trade, the job had to be done quickly, over just a few days. Fortunately the deadline was extended by another two days and I was able to produce some photographs of the inclusions as well as the 'passport' photo of each stone for the certificates. A composite picture of all the stones is seen in **1** showing the range of colour tones, although the size ratios are not to scale.

As can be seen, some of the stones were rather pale in colour, with greenish,



2: Yellow sapphire, 4.30 ct (a), when held up to light from a window, displayed internal straight graining (b).



3: (a) Yellow-brown sapphire 7.44 ct, showing no iron bands in spectrum, (b) crystal inclusion with stress haloes, magnification 60×, (c) halo feather of fine liquid droplets, magnification 80×, (d) other halo feathers from side view, magnification 30×.

brown and/or grey tones, although all 'yellow'. All of these (in my opinion) were natural colour, and invariably showed colour zoning, mostly of parallel bands, albeit not easy to spot because of the light colour. Included in this group was the largest stone, seen in the third row from the bottom (**1**), which was midway between yellow and light brown. The remainder were of the more intense yellow or golden tone and all showed signs of heat treatment.

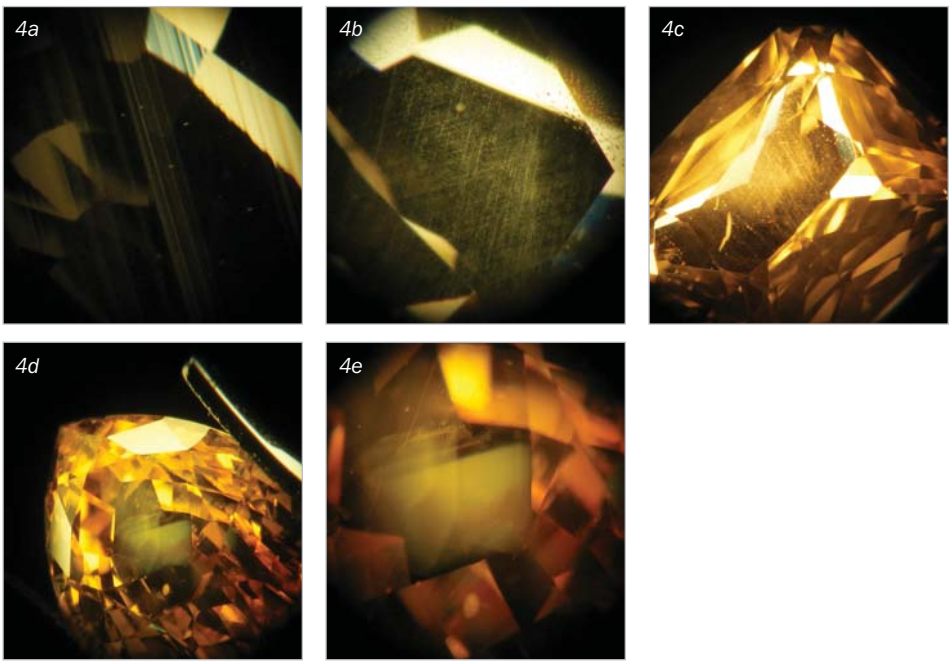
I mentioned earlier that I had come across yellow sapphires such as these on fairly frequent occasions, but it was always single stones or maybe two at once. This meant that I was familiar with the inclusions, but what I hadn't fully appreciated was the presence of 'graining' within such stones. Graining (which is rather like the curved striae in flame-fusion synthetic rubies, only straight) is a distinguishing feature of some stones, such as low-type green and brown zircon, but it had not become fixed in my mind with regard to East African yellow sapphires. Now, having all these stones together at the same time, it struck me that, without exception, they all contained graining which was visible to a lesser or greater extent. When faced with a stone with no feathers or crystal inclusions, the distinguishing of such a stone from a synthetic one is not easy. As an example, a 4.30 ct oval sapphire (**2a**) worth several hundred pounds per carat fortunately displayed strong graining (**2b**), thus distinguishing it from a synthetic version.

A feature one has come to expect from these golden sapphires is the presence of very strong absorption bands across the 450 nm part of the spectrum, often appearing as one dense band unless very strong transmitted light is used. This was the case here, except for some of the light coloured stones and also the brownish large stone of 7.44 ct (**3a**), where no bands (or very faint) were seen. Inclusions inside this brownish stone are shown in **3b–d**. The nature of the inclusions in **3b–d** would indicate no heat treatment, or certainly no high temperature treatment.

The presence of 'silk' was seen in the majority of stones, some of which was obvious, but which in others was quite faint. In some stones the silk was long and ran the full length of the stone (**4a**) whilst in others it was confined to an area (**4b–d**).

Although many of the sapphires showed some zoning or colour banding, the 3.19 ct example showing very distinct zones (**5**).

Feathers of varying types were a common feature, ranging from rather small and insignificant (not visible with the naked eye) to larger, extensive feathers. Some were rather flat and uncomplicated; the example in **6** is probably representative of an unheated stone. Feathers in other stones



4: Yellow sapphires showing silk. (a) Pale yellow 4.76 ct sapphire showing long silk aligned with graining direction, magnification 30×; (b) yellow 2.95 ct sapphire showing silk through most of the stone, magnification 15×; (c) yellow 3.02 ct sapphire, showing general silk inclusions but more dense in a concentrated area, magnification 7×; (d and e) bright yellow 3.19 ct sapphire displaying a small area of extremely fine, small silk particles, magnification 7× and 15×.

Hands-on gemmology

5: Although appearing even in colour when viewed from the table side, this 3.19 ct sapphire displayed strong colour zones when held up to a window and viewed through the pavilion.

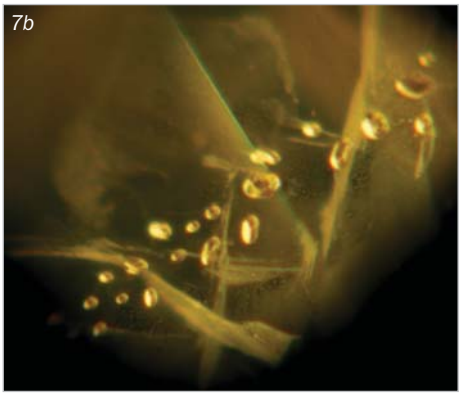
proved to be more complex. Twisted multi-feathers associated with a double row of crystals or negative crystals were seen in the 3.19 ct stone (**7a,b**).

An octagonal sapphire of 3.68 ct exhibited more prominent examples of feathers and negative crystal inclusions (**8**). Near the centre of **8a** is a faint, ghostly feather of fine 'droplets' that, in magnification, show small X-shaped voids (**8c,d**). (Photo **8d** is just an enlarged section of **8c**; the microscope did not have this high a magnification.) Also present in this sapphire is a burst halo, where fluid from a centre negative crystal has spread into the surrounding tension halo, which shows a typical atoll-like perimeter. This is proof of high-temperature heat treatment (**8e**). Further along more haloes overlap each other (**8f**). Photo **8g** is seen in usual dark-field light arrangement and then with the stone tilted slightly to arrange transmitted light reflected from back facets (**8h**). The transmitted light enables us to see the multi-phase nature of these negative crystals.

The sapphire depicted in **5** also exhibited a fairly large, spectacular tension halo, showing the effect of heat treatment, which can be seen towards the right-hand side in that photo and in more detail in **9**.

The 6.74 ct sapphire was, by contrast, free of inclusions throughout most of the stone, but displayed some graining, as previously discussed, and under a 10× lens showed an area of minute dark spots on the girdle edge. The microscope gave a better view of what turned out to be globular-shaped negative (assumed) crystals, accompanied by a fanciful halo arrangement (**10**).

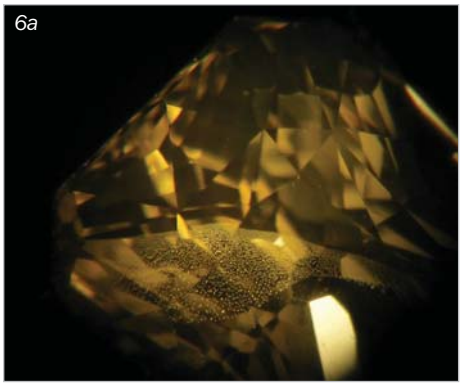
Another stone, a 5.29 ct emerald-cut sapphire, was clean on initial inspection but under the 10× lens showed three widely separated specks that looked like bubbles, which the microscope showed to be individual globular shapes like those in **10**. Graining was also present in this stone, but it can be difficult to distinguish this from surface polishing lines, and I did wonder at first whether a synthetic stone had crept in with the rest. The magnified image cast doubt on the bubble theory but I was now viewing this stone after having already seen the inclusions in the 6.74 ct stone. Looked at in isolation it may have been a different story.

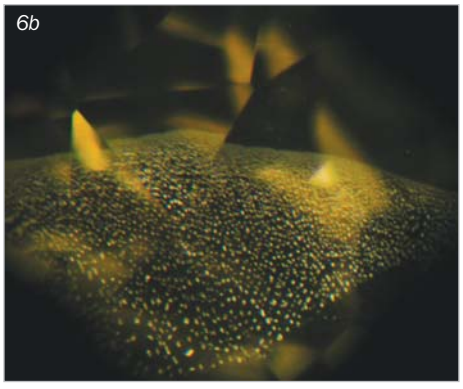


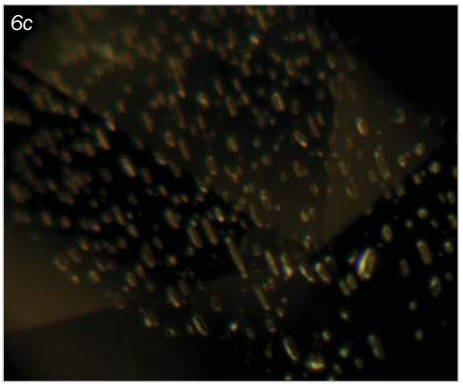
7: Yellow 3.19 ct sapphire at magnification of (a) 20× and (b) 70×. The green line is a facet edge.

The refractive indices for all the stones lay within the limits of 1.761 and 1.775 and all had the birefringence of 0.008.

The only thing left for me to look at was reaction to long-wave ultraviolet light (LWUV). The result was more mixed than I had anticipated. The lighter-coloured stones showed what would be expected of





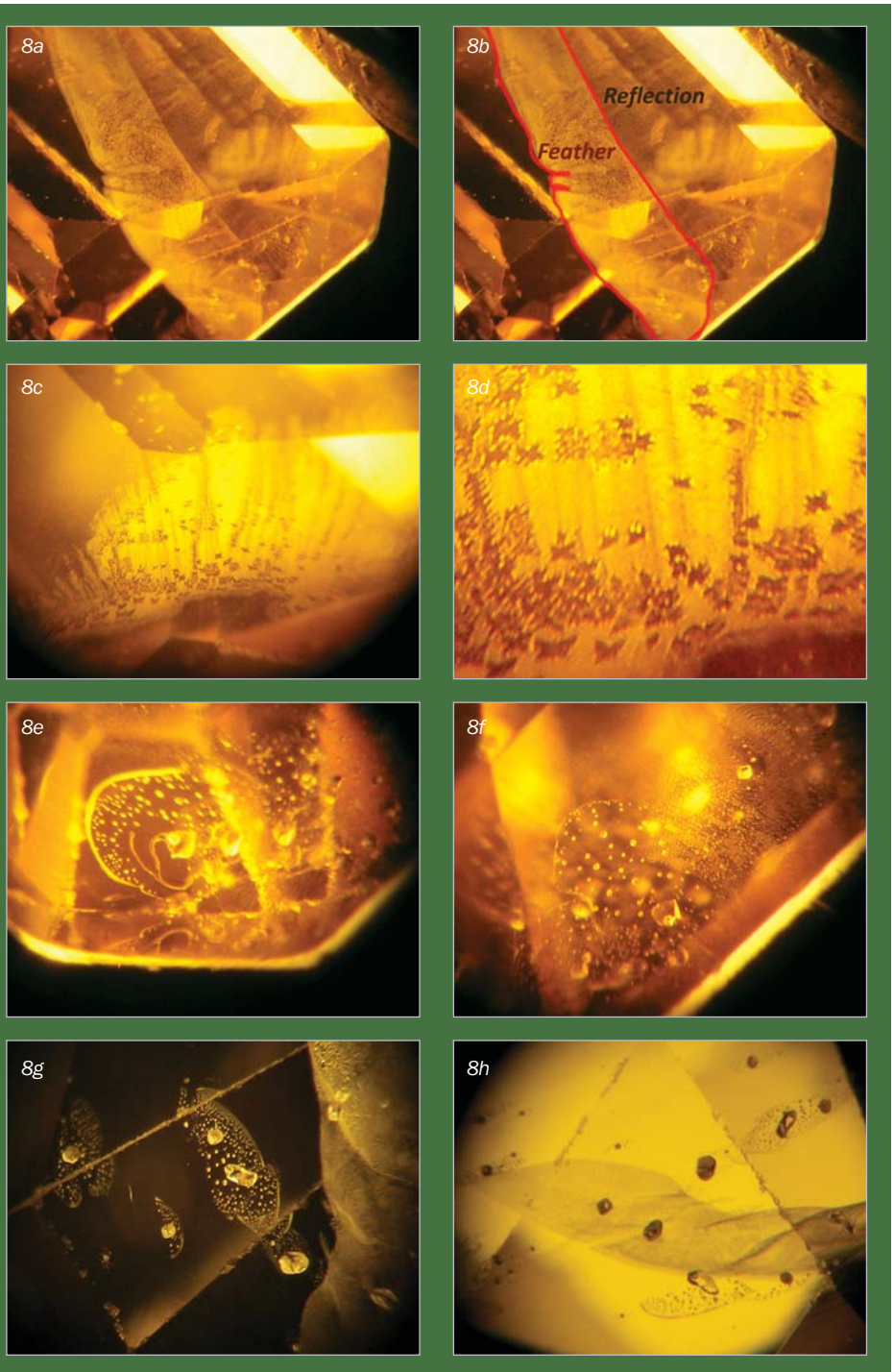


6: Light yellow 1.81 ct sapphire showing a large, but simple feather. Magnification shows the 'droplets' to be rectangular or negative crystals. Magnification (a) 10×, (b) 30× and (c) 80×.

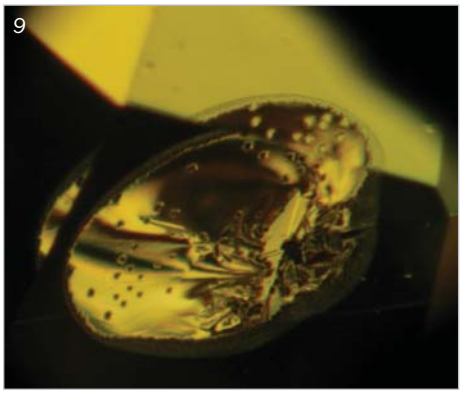
Sri Lankan pale yellow sapphires: a strong apricot-coloured fluorescence, while many of the golden-coloured gems showed no or very slight orange fluorescence — all as might be expected. What did surprise me was the number of stones (including the large brownish stone) that showed a pure orange fluorescence, varying from low to moderate to strong (**11**). With these four stones, the bottom and left-hand stone showed strong iron bands in their spectra, whilst the other two showed none.

Consulting my 'Gem responses to UV' personal notebook (an ongoing project — all serious gemmologists need to keep one), the flame-fusion synthetic yellow sapphire shows the following: pale yellow stones (not commonly seen) — orange to pink reaction; yellow stones — dull orange to red; orange stones — very dull reddish; brownish orange stones — none. The responses of the flame-fusion synthetics (in addition to lack of iron bands) are really too close to the results shown above to make fluorescence response and absorption spectra of much practical use in distinguishing them from the natural origin sapphires.

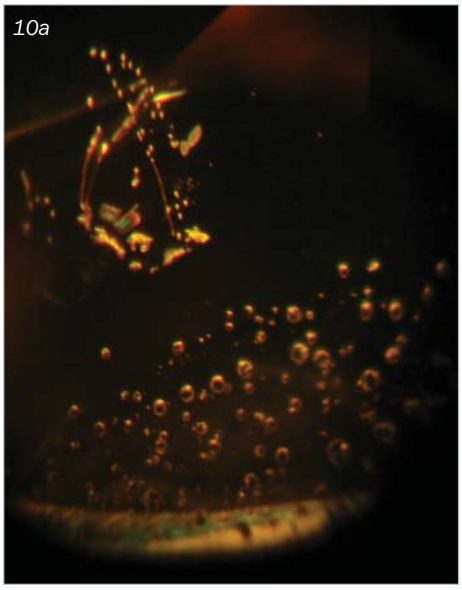
One other observation put me in mind of my old text books with regard to synthetic corundum. Anderson (1980) states: "Small, roughly parallel crack-like markings are often seen… in synthetic corundums. Lapidaries call these 'fire-marks'… They are only seen on corundum, and are only indicative of a synthetic stone because in these less care is taken to avoid such blemishes." I quote this from my 1980 edition, but no doubt this was present also in earlier editions. A similar explanation was also found in my Webster's *Compendium* (1964). I have seen such surface marks on a peridot, but one of the 41 sapphires showed them quite prominently. It was the pale brownish yellow 4.76 ct stone, the one showing the bright apricot fluorescence in **11**. Such was the size and depth of these 'fire-marks' that they were visible in the face-up position of the stone. I did not have time to properly photograph them, but they are visible in the general photo of the stone (**12**).

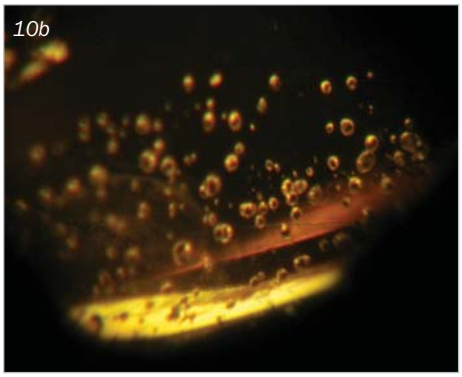


8: Octagonal 3.68 ct sapphire: (a) long feather showing typical ruckled edge, magnification 10× and (b) where the feather is reflected at its interface with the back facets; (c and d) faint feather showing 'X'-shaped voids, magnification 50× and 200×; (e) a burst halo, where fluid from the centre negative crystal has spread into the surrounding tension halo, which shows a typical atoll-like perimeter, magnification 40×; (f) the prominent negative crystal is the shadowy one shown to the right in 8e, magnification 50×; (g) multi-haloes, magnification 60×; (h) the area in 8g is shown in the top left, but with transmitted light it reveals the different phases of matter within the negative crystals.



9: The 3.19 ct sapphire (5) showing reflective halo disc and frosted rim, a result typical of high temperature treatment, magnification 40×.



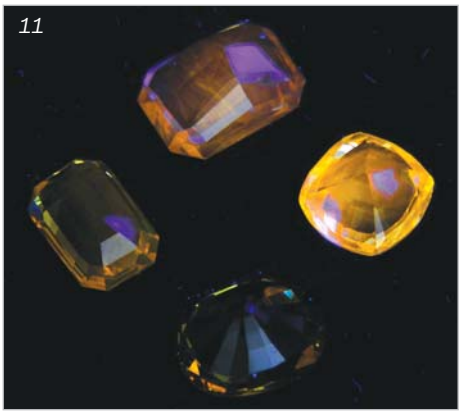


10a and b: The otherwise clean 6.74 ct sapphire showing a cluster group of globular negative crystals (the yellow bright area at the bottom is the girdle edge), magnification 80×.

Summary of findings

To summarize, the East African yellow to brownish sapphires examined gave the following reactions:

- all showed straight growth striae (graining)
- many had colour zoning (straight or zonal, minimal to pronounced)
- some had feathers consisting of rounded rectangular negative crystals
- many had feathers exhibiting folded or ruckled edges
- negative crystals were present with tension cracks in untreated stones
- negative crystals were present with atoll-like haloes in heated stones
- negative crystals were present as rounded globules, as individual inclusions, in formation of one or more rows, or as a random cluster
- all stones showed 'silk', varying from very fine which was not immediately visible, to coarser clouds, or aggregated as lines, and all could be described as 'pecked-line' rather than 'dotted'
- the 450 nm complex of bands was strongly present in the absorption spectra of many, but missing in some



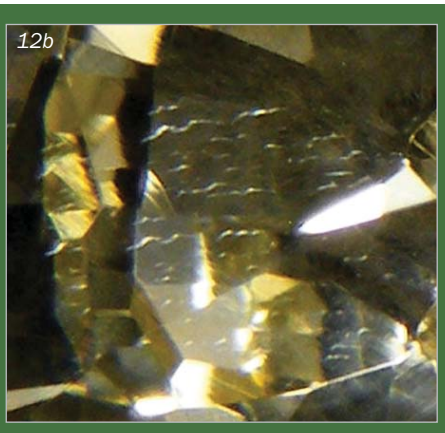
11: Reactions of yellow sapphires to LWUV (clockwise from top); light brown showing strong orange fluorescence; pale yellowish brown showing strong apricot fluorescence; rich golden yellow showing no effect; medium golden colour showing medium yellowy-orange fluorescence.

- the LWUV fluorescence varied from inert to slight to moderate to strong orange, or in some light-coloured stones, bright apricot.

References

Anderson, B. W., 1980. *Gem Testing*. Butterworth-Heinemann Ltd, London.

Webster, R., 1964. *Compendium*. N.A.G. Press, London.



12(a and b): 'Fire-marks' on the pavilion facets of a 4.76 ct brownish yellow sapphire. Magnification (a) 8× and (b) 35×.

About the author

For many years Grenville Millington ran his own gem and jewellery business, and taught gemmology and retail jewellery at the Birmingham School of Jewellery.

Gem-A

THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

Full spectrum learning:

Further your career with the Gemmology Diploma, the most prestigious international gemmology qualification in the gem and jewellery trade.

Gemmology Diploma

(Four month Daytime study programme in London, only open to those who have completed the Gemmology Foundation course)

Start date: 16 September 2014 – January 2015
Class days: Tues, Wed, Thurs*
Course fee: £4,780

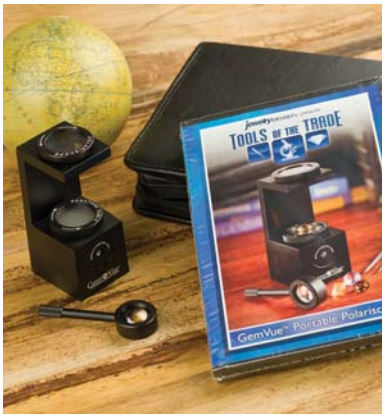
*Self-study day.

Understanding Gems™

Visit www.gem-a.com

Shine Bright

Celebrating 20 Years of Opening the World of Jewelry and Gemstones to Everyone!



As the largest retailer of loose gemstones in the world, Jewelry Television is committed to offering more of the naturally beautiful treasures that our customers adore.

Education, Expertise & Entertainment

We take pride in our longstanding commitment to education. With programs like our web-based GEM-A course and our on-air Jewel School® series, our partnerships bring industry luminaries straight into the homes of jewelry and gemstone aficionados everywhere.

Educational videos, professional tools of the trade, plus live programming with knowledgeable hosts place Jewelry Television and jtv.com at the forefront of a dynamic learning and shopping environment.

Into the Future

At the heart of our vision is a continuing quest to deliver the rarest of gemstones, plus educational resources and world-class gemstone authorities to our customers. We believe this is the ultimate way to enlighten, inform and entertain, as we take flight into our next decade.

20 yrs
jewelry television®

JTV Your Way

To order call 800-619-3000 or visit jtv.com